WHAT ARE OUR OBJECTIVES?

What are our objectives regarding B-109?	**Why?**
If possible, stop the leak of B-109 into the soil. Put another way, subject as much tank waste as possible to treatment before it has been disposed in the environment.	If the waste escapes into the soil, this is bad and worth stopping now. Once in the soil it will not be taken out again without extreme cost and conflict between the parties. The likely path is a model saying the waste poses insufficient risk to remove from under the tank. Best to avoid all that pain now if we can. But why? Because this kind of failure simply should not be allowed.
Don't do more harm retrieving the waste than would be avoided by stopping the leak. If more than 15,000 gallons of waste would get into the soil from today,	First, do no harm. Dilution vs. mobilization of new contaminants held in the salt.
Prevent the leak from getting bigger (i.e., don't allow new liquid in the tank or do anything physical or chemical that would make the tank leak get faster)	First, do no harm.
Don't break the bank on a response. Invest wisely.	We still need money to get the full WTP up and running, and to ensure we can respond to the next leak which may be bigger or worse. On the flip side, if we respond to this leak, we may learn things that make us better equipped to respond to the next.
Big picture, prevent the groundwater from being irretrievable and unsafe to drink.	Leaks are below a depth where future users of the central plateau would be affected by direct exposure, so the water pathway is the source of greatest risk. Maybe the more appropriate question is When and Where?
Don't let doing nothing become a habit when new tanks spring a leak.	We have a long mission ahead. More tanks will fail. We need a good and consistent response.
If all waste from the tank is retrieved, turning it into grout is complicated, but better than nothing.	Is it HLW? It's had the cesium removed and maybe soluble strontium too. It would still contain small amounts of Tc-99 and I-129. We don't know if the waste would make good grout (organics or other spoilers?). We don't' know if it can be done in a legal way. If we move fast to make grouted tank waste now, will the precedent being applied to more tank waste cause greater risk down the road?

HOW CAN WE ACHIEVE OUR OBJECTIVES?

Strategy	Pros	Cons	Mitigation / Questions
Empty all B-109 contents to a DST "immediately" using existing retrieval/transfer methods.	• Stops the leak by removing waste • Does not require final treatment to be operational today.	• Requires ~2 miles of piping - $MMM • Requires installation of retrieval infrastructure (time + $, inefficient for one tank) • Uncertain whether adding water to tank for saltcake dissolution/retrieval will result in overall more leakage. • DST space limited and spread across multiple tanks – will potentially require many transfers - $$ + time • Can it be done before the waste leaks out? (~10 years)	Could B farm be made the next farm to be retrieved after A/AX? (would require Waste Receiving Facilities to be built at B farm immediately, so probably not). Also probably wouldn't be in time to catch the leak.

Pump only retrievable liquids (not whole tank contents) to a portable above ground storage tank or tanker truck.	• Dry tanks don't leak.
	• Only 15,000 gallons. One tanker truck holds ~9,100 gallons.
	• No new DST needed
	• Rapidly implementable?
	• Could use TSCR as a decontamination step to reduce dose outside aboveground storage
	• Does not require final treatment to be operational today.
	• *Potentially* fastest and cheapest option
	• The SST liquid retrieval study from 2020 scored "enhanced saltwell pumping" tied for first-place for interstitial
		• How pumpable?
		  ○ TCH article references 2,000 gallons of free liquid on top of the salt layer, with another 13,000 gallons in saltcake pore space.
		  ○ It's unclear how long it would take to get enough liquid to seep into the saltwell. Uncertain how long it would take to drain and whether it would stop the leak/beat the current rate of leakage.
		• Permitting of temporary storage uncertain.
		• Uncertain whether long-term storage is potentially dangerous due to waste interactions, emissions/pressure, corrosivity (unlikely due to corrected pH and the fact that the waste is stable in the SST today)
			• How quickly could an enhanced saltwell pump be installed? Access issues?
			• Dose? Could the vehicle be remotely operated?
			• How long would it be acceptable to store the waste inside the truck/tote?
			• Where would it be acceptable to go next until the LAW facility is operating?
			• Could a tanker truck apparatus connect to a tank or treatment inlet?
			• How much waste expansion would occur during retrieval?
			• Could an aboveground tank have dual walls or be placed inside another facility to give permit-required secondary containment?
			• Could the liquid be simply driven over and dumped into a DST?

Commented [BJ*O1]: From the SST liquid retrieval study for enhanced saltwell pumping: A saltwell liquor transportation system to an appropriate double-shell waste storage tank is required. The saltwell liquor transportation system could consist of items such as HIHTL, shielded double-contained, above-ground, catch tanks, and shielded tanker trucks.

	supernate removal due to "likelihood for success" and "design maturity".		• Could the liquid be treated by the 200W pump and treat system? It's "pre-soil contamination" after all . . .
Dry out the tank using new liquid pumping+evaporation technology from SST liquid retrieval study	• Dry tanks don't leak. • *Potentially* fastest and cheapest option • Does not require final treatment to be operational today • The SST liquid retrieval study from 2020 scored "enhanced saltwell pumping + evaporation" tied for first-place for interstitial supernate removal.	• Rate of drying estimated 6 gallons per year per 100 CFM of air. This would take ~7 years after fabrication/ permitting/ installation of equipment IF you assume only 100 CFM and if the saltwell pump can keep 2,100 gallons of liquid on the surface at all times (the rate estimate assumed the whole 75 ft diameter waste surface was a puddle). • May not stop the leak in time (10 years). Assuming 6 gals per day evaporated, it would only catch ~½ of the 15,000 gallons currently available to leak if installed today. • Air emissions would need to be understood and managed.	• What is the status of this technology? • How quickly could it be deployed at B-109? Access issues? • Given the emission issues with T-111, is this feasible from a regulatory perspective?
Add impermeable cover over B-109	• Stops precipitation entering tank and/or driving leaked contamination • Could lead to less in-leakage over the 25 years until the tank is scheduled for retrieval.	• Leaked waste is likely under the "rain shadow" of the tank and not susceptible to precipitation driven migration. • Won't stop existing liquid in the tank from continuing to leak. • Costs time and money – can it be done in time to make a difference?	Are the 2,000 gallons of liquid on top of the salt layer in the tank the result of rain infiltration? Over what time span?
Retrieve B-109 to mobile Test Bed Initiative equipment and dispose tank waste in grout [ONSITE/OFFSITE?]	• Stops the leak by removing the waste. • Potentially results in waste disposed off-site • Crisis creates the opportunity to clear the policy logjam earlier, which could have	• Uncertain whether adding water to tank for saltcake dissolution/retrieval will result in overall more leakage. • According to WA, disposal out of state will require a RCRA treatability variance from the host state (i.e., Texas if disposed offsite)	• What would happen to the sludge? Would it stay behind or be put in grout also? • What is the status and timeframe to have a mobile TBI unit ready for retrieval?

Commented [BJ*O2]: Per the SST liquid retrieval study:
As previously discussed, Tank 241-T-111 used a single-pass ventilation system for supernatant reduction between July 2015 and April 2019. Continued operation of this system was suspended as efforts to obtain an air operating permit for the emissions of toxic air pollutants from Tank 241-T-111 were put on hold until the Washington State Department of Ecology concerns over the location of the ambient air boundary are resolved.

	larger benefits for the tank mission depending on the outcome.	• Requires rapid resolution of HLW/RCRA disputes between federal government and state. • Does not remove Tc-99 (0.44 Ci) or I-129 (0.04 Ci). Could present risk if left onsite (but likely less risk than actively leaking to soil and a low inventory compared to ERDF/IDF limits). • Time to design/procure/permit/install equipment may not be fast enough to stop the leak (~10 years) • Sets a precedent that may have larger implications for future tanks.	• What is the status of holistic negotiations on this front? • Would the waste make good grout or does it have spoilers? • Who would do the grouting, and what is the permitting status/process/timeline for that?
Build new DSTs	• Creates more overall tank space for future leaks • Requires fewer waste transfers for near-term SST retrieval • Can be located closer to B-farm to reduce transfer costs. • Benefits rest of treatment mission (? – see System Plan 9 scenarios)	• Tank permitting and construction would likely take so long that the leak would be gone before new tank is ready. • Expensive proposition if the only purpose were to stop the B-109 leak.	• Could above-ground tanks post-TSCR be a cheap/fast way to get the water-bearing saltcake out of the tank? May not be a good solution for the remaining sludge. • System Plan 8 plans to build Waste Receiver Facilities at B and T tank farms, which are basically new tanks to aid retrieval in remote areas. This construction is planned for 2035 – could it be moved up?
No Action	• Focus money on finishing WTP • Existing pump/treat catches mobile rads eventually (needs confirmation).	• 15,000 gallons more tank waste reaches the soil and likely won't be dug out in the future. • Non-mobile constituents could stay in the soil below the tank and not be exhumed in the future. • Could set a precedent for future leaks – overall burden to soil could be much larger if we don't have a strategy biased toward action.	• What is the composition of the waste that's leaking? Is it carrying mobile constituents with it? Changing chemical mobility of other wastes already in soil? • What is the added burden to the sitewide groundwater risk?

Grout the tank in place	• Stops leak by solidifying tank contents and absorbing liquid in grout formation. • Existing pump/treat catches any leftover mobile rads (needs confirmation). • Can be deployed quickly (if approved) • Sets a precedent that could save DOE time and money if applied more widely.	• Uncertain whether grout will mix and set properly. • Lengthy permit process for RCRA closure not likely to finish in time to stop the leak and may not meet state approval. • Inconsistent with Tri Party Agreement tank retrieval milestone. • Inconsistent with existing WIR process for waste classification/tank closure (but likely consistent with new DOE HLW interpretation) • Low public support criticism / higher perceived risk to critical resources. • Sets a precedent for other tanks.	

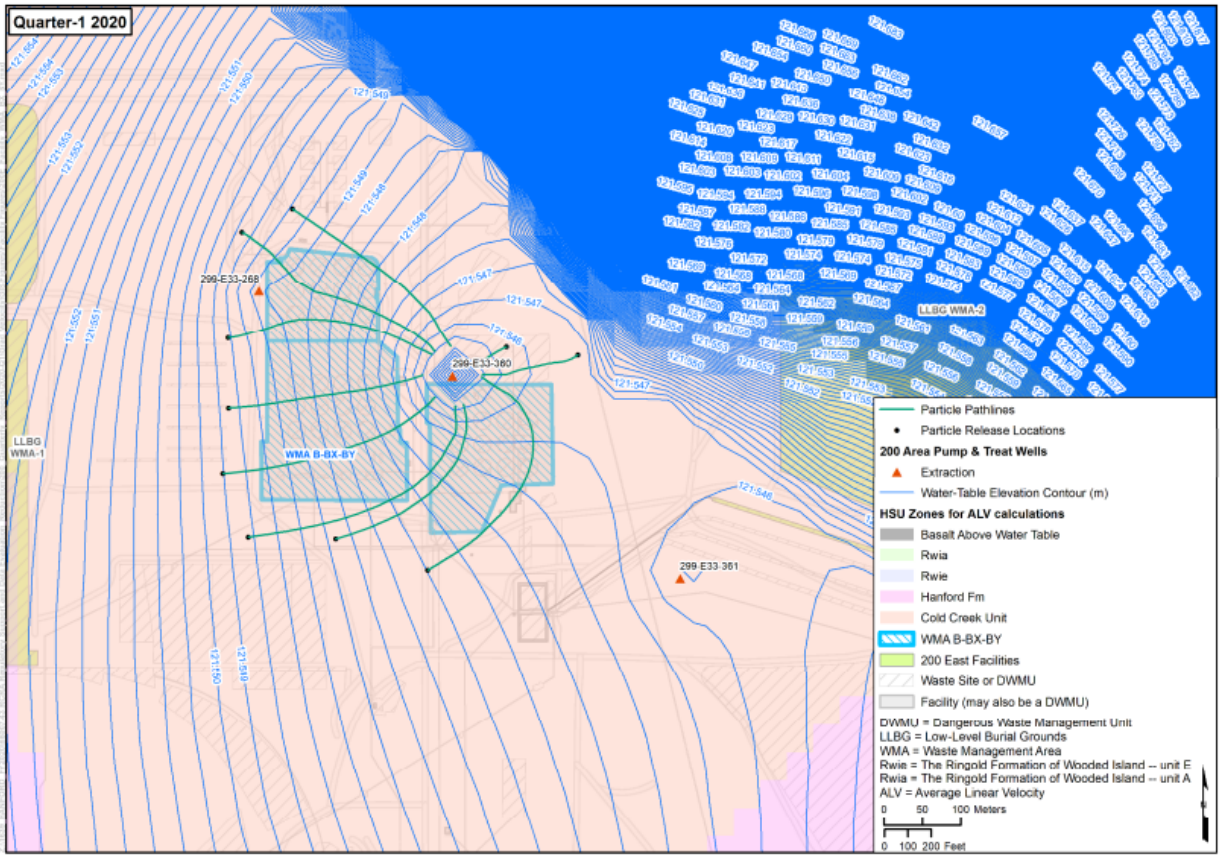

Figure 7-47. Calculated Particle Pathlines Representing General Groundwater Flow Directions at WMA B-BX-BY for the First Quarter of 2020